EPA Comments on Draft Treatability Study Literature Survey Technical Memorandum

General Comments

It should be recognized that the state of sediment treatment is evolving and will continue to evolve until sediment remedies are evaluated and implemented at the Portland Harbor site. In addition, the consideration of sediment treatment has been identified as a key issue by the Portland Harbor Community Advisory Group (CAG). As a result, it is critical that sediment treatment options receive a thorough and rigorous evaluation recognizing that treatment costs can be off-set by beneficial re-use of contaminated sediments post treatment.

The initial evaluation of treatment technologies should focus primarily on cost and effectiveness at this point. Siting and permitting challenges should not be used as a screening criteria at this time. Although EPA recognizes that permitting and siting may result in significant challenges, if the technology is effective and cost competitive, it will be in everyone's interest to overcome these permitting and siting challenges.

Overall the Treatability Study Literature Survey presented a comprehensive overview of the "world" of sediment treatment categories and parallel technologies that have undergone bench through commercial scale applications. The literature review covers a wide chronology from the early 1990's to 2006. However, it should be noted that that much of the published work goes back years before the actual publication date. Pilot and full-scale demonstrations of sediment treatment processes (both standard such as dewatering and stabilization/solidification as well as innovative treatment processes) have been progressing over the last 3 years. However some of this recent work has not been reported in literature since it could be part of a private client project, or a larger programmatic federal/state demonstrations currently evolving as more full/commercial scale demonstrations / remediation projects collecting data for regulatory and geotechnical requirements. The Treatability Study Literature Survey should identify, summarize and evaluate the application of treatment technologies at some of these more recent projects.

The Portland Harbor feasibility study (FS) and evaluation of treatment options should consider the concept of net risk reduction. EPA's Contaminated Sediment Remediation Guidance for Hazardous Waste Sites EPA describes "net risk reduction" as a method to ensure that all positive & negative aspects of each sediment management approach are considered at contaminated sediment sites. Net risk reduction considers not only the overall risk reduction offered by different remedial action alternatives, but also risks introduced by implementing the remedy. Treatment of contaminated sediments – whether in conjunction with sediment removal or not – can provide long term risk reduction that should be factored into the analysis of net risk reduction.

EPA recognizes that the standard sediment remediation technologies are generally the most proven and cost effective. These technologies include: 1) Dredging and the subsequent disposal and placement options - nearshore confined disposal facilities (CDFs), confined aquatic disposal (CADs) and upland disposal with or without pretreatment such as stabilization; 2) capping and 3) monitored natural recovery. However, further consideration should be given to hybridization of sediment remediation and treatment options to address multiple contaminants and integration into long-term regional sediment management (including beneficial use). It should be noted that due to the scale of the Portland Harbor RI/FS, significant quantities of contaminated sediment will require management. These sediments (perhaps in conjunction with dredging projects being contemplated by the U.S. Army Corps of Engineers or at specific facilities) may create some economies of scale for treatment and beneficial re-use of contaminated sediments. The treatment train process which includes up-front materials handling should be a significant factor in decision making of the alternatives. This has proven over and over to be more of an economic factor to a project than the process choice itself.

Specific Comments

Section 2.2: It should be noted that EPA has identified additional iAOPCs beyond those identified in the Round 2 Report.

Although a number of early action sites have been identified, the timing of remedial actions at these sites is currently unclear.

Section 5.1.1 – Passive Dewatering: The Treatability Study Literature Survey identifies the use of geotextile tubes as a passive dewatering device. This technology has been applied recently at the Ashtabula River in Ohio. Information from the implementation of the Ashtabula dredging project managed by the EPA Great Lakes National Program Office should be consulted to better assess the applicability of geotextile tubes at the Portland Harbor site.

Section 5.3.3 – Stabilization/Solidification: The cost of Portland cement for stabilization/solidification is not trivial and is increasing per ton of cement. Current costs for stabilization/solidification with Portland Cement are approximately $100/ton. Stabilization/Solidification processing of NY/NJ harbor sediments is approximately $55-65 cubic yard when used as geotechnical fill for brownfields and sub-base for golf course construction. Clearly, beneficial re-use is one way to reduce unit costs associated with stabilization/solidification.

Section 5.4.3 – Thermal Desorption: The Upcycle lightweight aggregate (LWA) process did not continue its pilot-scale test at the Bayshore Recycling facility in Keasby, NJ. However, there is no reason to believe that lightweight aggregate could not be a viable process with a high value beneficial use product. The concept behind Upcycle though was to utilize existing LWA kilns using a sediment feedstock that would be dewatered and pelletized before *feeding* the kiln.

Section 5.4.4 – Vitrification: It should be noted that the Bayshore Recycling facility is not a regional sediment decontamination facility. The Bayshore Recycling facility was used as an up front materials handling platform utilizing a Great Lakes ore/grain carrier for a sediment hold. The material was pumped out of the ship across a dock into a large warehouse building that housed the BioGenesis sediment washing process. Approximately 14,000 cubic yards of sediment was dredged and processed from the Raritan River, NJ, Arthur Kill federal navigation channel and the Passaic River, NJ Superfund site as part of a dredging pilot (Passaic River) and full-scale sediment decontamination demonstration (2005-2007). BioGenesis dewatered sediment for GTI (Gas Technology Institute) Cement-Lock process utilizing a plate-frame filter press which was part of their liquid/solid separation process. GTI conducted their demonstration of their thermo-chemical process at the IMTT Facility in Bayonne, NJ using a 10,000 cubic yard/yr demonstration kiln.

The Treatability Study Literature Survey states on page 18 that the "downside to this [vitrification] technology is that the process requires significant electrical energy (or natural gas in the GTI case) and thus costs significantly…" It should be noted that high temperature systems have evolved into waste to energy – gasification, heat recovery – electrical generation designs that over time could be cost effective with manufacturing of a high value beneficial use product (construction grade cement, light weight aggregate etc).

Section 5.5 - Summary: It should be noted that the BioGenesis sediment washing and GTI Cement-Lock process are in the process of submitting draft-final reports from their full-scale demonstration efforts (2006-2007). Both processes are included in the USEPA Passaic River Superfund Focused Feasibility Study (www.ourpassaic.org) as components to hybrid remedial options. Technical memorandums and preliminary results including costs are included in this study. In addition, the USACE ERDC Vicksburg is in the process of developing a report on the "State of the Art of Treatment Technologies" – they are focusing on ex-situ technologies with beneficial use applications. This deliverable will include mass balance and economic projections. Trudy Estes is the principal investigator on this effort.

Section 6.0 - In-Situ treatment: It should be noted that Rutgers University (Ali Maher) and Raito, Inc conducted deep sediment mixing at a site in Newark Bay, NJ under work sponsored by the NJ DOT. A report on this effort is on the NJDOT Office of Maritime Resources website.

Section 7.0 – Evaluation of Treatment Technologies: More successful processes have looked at the treatment train concept of materials handling, technology development, and beneficial use applications. Price structures based on available data today range between $65 – 150 per cubic yards. Treatment technologies should be evaluated not as stand alone options but rather as part of an integrated approach to sediment managment that consideres treatment trains and beneficial re-use. From a programmatic cross-integration perspective, this may include both navigational and Superfund sediments which are critical to accomplish enough flow-through capacity for these technologies to succeed economically on a large scale over the long term. Other programs that may benefit from sediment treatment technologies include brownfield cleanups (soils, sediments, and demolition and construction debris). Integration of technologies as part of a multi-media regional processing facility could provide long-term sustainable infrastructure in conjunction with CDFs to provide active storage capacity to make these facilities renewable and to manufacture beneficial use products.

Section 7.2 - Beneficial use Evaluation: The referenced text states that beneficial use evaluation of treated and untreated sediment options are not part of this literature review and will be considered in the FS on a case-by-case basis. EPA believes that beneficial re-use of treated dredge sediment should be considered in cost estimates for the general evaluation of technologies. Furthermore, it would be helpful to include an initial market survey for potential "beneficial uses" of treated and untreated excavated sediment (e.g., any chance of using sediment in building or road-bed materials in the Portland area, etc.).

Section 7.2.1 – Upland Values for Screening: EPA generally agrees with the strategy of defining upland screening values for dredged sediment, but have several concerns:

- The only screening values the LWG considered were those based on protection of human health. If there is a current or reasonably likely future chance of terrestrial ecological receptors being exposed to the dredge sediment placed in an upland facility, then toxicity eco screening level values would need to be considered. DEQ considers soil to terrestrial eco receptor to be a potentially complete & possibly important exposure pathway (mainly thru ingestion or diet), however, DEQ does not currently have bioaccumulation screening values for this pathway. Placing a strongly bioaccumulative contaminant in an upland facility may require consideration of this pathway.

- The evaluation of treatment technologies should also consider the potential use of in-water or nearshore disposal in a CAD or CDF, or as fill material for Ross Island. Treatment could reduce contaminant levels, bioavailability, leachability etc., sufficient to make these disposal options viable for otherwise unacceptable material. Screening values for dredged sediment for in-water or nearshore disposal should be developed and used in addition to the screening levels for upland disposal.

- The referenced text states the upland values for screening were selected from DEQ's "most restrictive ODEQ residential upland soil cleanup risk-based concentrations" (p.30) that a re based on direct contact with soil. DEQ's Risk-Based Decision Making (RBDM) Guidance considers several human health exposure pathways, & generally, the direct contact with soil pathway lists the most conservative screening value. However, for naphthalene, the most conservative soil screening value is for the leaching to groundwater pathway. This soil leaching to groundwater pathway lists a screening level value of 3.8mg/kg. The LWG used the direct contact screening level of 34mg/kg in their tech memo.

- The document describes additional consideration for PCB-bearing sediments, including DEQ's PCB Generic Remedy guidance. The LWG's tech memo cites upland generic-remedy soil values for PCBs of 1.2mg/kg (residential) & 7.5mg.kg (industrial). The literature review states that DEQ guidance is not directly applicable to the upland disposal of dredge sediment, and that the generic-remedy soil values are presented to simply provide insight. However, the literature review fails to mention that DEQ's PCB Generic Remedy guidance states these generic-remedy soil values apply only where PCBs are the main risk driver, not in a mixture of other risk-driving hazardous substances.

Section 8 – Final Evaluation and Treatability Study Recommendations

As mentioned above in the general comments, *The Probability of Further Evaluation and Consideration for Evaluation in FS* choices for “Very Likely” are fairly obvious within the “world” of alternatives. Optimization of test/project sediment for physical characteristics, chemistry, etc under bench-scale conditions are routine. What was somewhat surprising was the “Very Likely” rating for Asphalt Emulsion. Though it was mentioned that the process has been proven for soils, (NJDEP Division of Science and Research conducted a pilot in 1998 for soils) it's still from what appears to be under bench-scale development for contaminated sediments with organic and inorganic constituents.

Innovative sediment treatment technologies with beneficial use applications has evolved over the last several years. As more demonstration tests have been completed on pilot and full-scale equipment, more environmental and process data (residual management) has been collected that fulfills regulatory and permitting mandates. Economic data today is also more realistic and critical to commercial-scale process design and especially to venture capitalists who would invest in innovative technologies.

EPA agrees that the technologies likely to move forward into the FS are generally conducted in combination with other technologies or have potential beneficial uses combined with low process costs. As a result, it is critical that the feasibility study consider beneficial use cost off-sets.

The Literature Review states that the technologies being carried forward are generally proven and treatability studies are not warranted to support the FS. EPA does not see the need for treatability studies for those technologies at this time. In the absence of site specific treatability studies, the Portland Harbor FS must assume that these proven treatment technologies will be effective. Further discussion is required to determine how pilot scale evaluations and the assessment of more generic technologies (e.g., solidification/stabilization and capping amendments) will be considered in the FS and remedial design.

The report recommends further investigation of the costs associated with technologies assessed as "unlikely" but with the potential to become economically viable (e.g. ex situ biological and physical/chemical methods). The report notes that the information would be used to determine the likelihood of carrying these technologies forward in a detailed FS evaluation and, if so, treatability testing of the technologies in late 2008 may be warranted. A proposal should be developed to conduct the additional investigation, including other factors to consider in addition to cost, so that treatability testing could be initiated in 2008 if appropriate.

Table 1:

- It is unclear why sorbent clay solidification/stabilization is ranked as very unlikely. It is proven at the bench scale. Demonstrated effectiveness is moderate to high and cost is ranked as moderate.

- It appears premature to eliminate ex-situ chemox. This technology is widely used in the wastewater treatment field and could be implemented as part of a treatment train.

- It is unclear why sediment washing is ranked as very unlikely. It is demonstrated as limited full scale.

- Vitrification and Thermal Desorption: It is unclear why these technologies are ranked as unlikely. They have been demonstrated in the New York/New Jersey Harbor area and encourage end use application.

- iAOPCs were grouped according to contaminant and analyzed with respect to potential upland disposal and cleanup levels to determine which sediments would require pre-treatment prior to landfill disposal under a removal GRA scenario. This grouping was based on “risk drivers”, ultimately using a single risk driver (ie, PCBs) for an iAOPC. The need for treatment may be driven by other contaminants as well (another constituent may be more mobile or have high toxicity as well). The upcoming leaching tests results will provide additional information that should be considered for some of the areas.

Table 2:

- With the exception of enhanced cap materials, in-situ treatment technologies are all rated as unlikely or highly unlikely. EPA acknowledges that effective in-situ treatment options are currently limited. However, there may be some opportunities at specific locations within Portland Harbor where in-situ treatment technologies could be effective, and they should not be screened out as this stage. The results of ongoing pilot scale work, like the activated carbon pilot projects at the Grasse River (Alcoa), marine sediments in Trondheim Harbor, Norway, and tidal mudflats in San Francisco Bay, should be considered as it becomes available and included as appropriate during the FS. The pilot projects are evaluating different engineering methods of application of activated carbon to PCB-impacted sediments to alter sediment geochemistry and bioavailabilty of PCBs to benthic organisms.